SYNTHETIC MULCH

This patent application is a continuation-in-part of currently pending U.S. Patent Application Serial No. 09/321,779, which is a continuation-in-part of U.S Patent No. 5,910,514.

FIELD OF THE INVENTION

The present invention relates to a synthetic mulch material, which is designed, dimensioned, and colored to look like natural mulch, and a method for making the synthetic mulch material. More specifically, the synthetic mulch material is made of rubber and is colored and textured to look like any of a variety of natural mulches.

BACKGROUND OF THE INVENTION

Mulch is a protective covering material that is typically placed on top of soil and which is used in association with ornamental lawns and gardens. Often the mulch material is placed around trees, shrubs, and bushes to give a pleasing appearance and to prevent the evaporation of water from around the trees, shrubs, or bushes. In general, mulch is any of a variety of materials, which are used to prevent evaporation of water, protect roots from freezing, and retard the growth of weeds. The mulch material retards the growth of weeds by preventing sunlight from reaching the surface of the ground, which prevents the growth of many plants. Also, the mulch forms a barrier many plant species cannot penetrate. Freezing of roots is prevented because the mulch functions similar to insulation. The mulch prevents evaporation by preventing the surface from being directly contacted by sunlight.

Mulch materials have traditionally been natural materials, such as hay, wood chips, bark, rocks, pea gravel, leaves, and other similar natural plant and mineral materials. The natural mulch material has generally been effective in preventing evaporation and retarding the growth

of some weeds. Natural mulches have further been used because they are attractive and blend in well with natural landscapes. Thus, natural mulches enhance the appearance of a landscape or an ornamental lawn, while functionally preventing evaporation of water and preventing the growth of some weeds. In addition to being functional and attractive, natural mulches are used because they are readily available. Typically, natural mulches are derived from left over plant and mineral materials which have few other uses beyond mulch, consequently natural mulches are further desirable because they are an affective way to usefully dispose of waste plant and mineral materials.

While natural mulches have a number of useful properties, they suffer from a number of drawbacks. One of the primary drawbacks is that natural mulch allows for the growth of too many undesirable plants or weeds, as natural mulch typically does not sufficiently cover an area in a way to prevent the growth of weeds. Also, natural mulch tends to break-down or decompose, meaning it may have a short use life. The decomposition of the natural mulch may also result in offensive odors. Further, some natural mulches tend to dissipate from the areas where they were placed as a result of wind or water runoff carrying the mulch away, as many natural mulches do not have a high specific gravity. Natural mulches are also undesirable because they attract insects.

In response to the problems associated with natural mulches, a variety of synthetic mulches and similar products have been developed. One such mulch is made from plastic materials, such as thermoplastics, which are typically used to form hard plastic objects such as milk jugs, boat hulls, and pipes. The use of a thermoplastic in the construction of a synthetic mulch, however, suffers from a number of disadvantages. Thermoplastics are not easily colored

to look like natural mulches, which is preferred, thus the user of a thermoplastic mulch typically has a limited number of colors to pick from. Also, the thermoplastic mulches do not look realistic or natural, instead they have an "artificial" look. Mulches made of thermoplastics also suffer because they are generally hard and may have sharp edges. It is known that most thermoplastics are rigid, hard materials so that when a synthetic mulch is made from the thermoplastic material, the resulting mulch will provide very little cushioning. This is undesirable because, frequently, synthetic mulch is placed on areas where children play. Thus, it would be desirable to have a synthetic mulch which has all the characteristics of a natural mulch, but which does not break down, and which is soft and can be easily colored.

SUMMARY OF THE INVENTION

The present invention relates to rubber materials which are colored and textured and which have a diameter equal to at least 1/16 inches. The surface of the rubber materials is embossed, so that the surface will have ridges and valleys, which will give the materials a rough feel. The colored textured rubber materials can be used for a variety of different applications including use as a mulch or as a playground surface.

Preferably, the present invention relates to a synthetic mulch, methods for making the synthetic mulch, and uses of rubber and coating to make synthetic mulch. The synthetic mulch of the present invention is comprised of rubber particles and any of a variety of coatings. Rubber particles are preferred because rubber allows for a mulch that yields when impacted, does not have sharp edges, retains an amount of water in the soil covered by the mulch, prevents the growth of weeds, is non-toxic, does not emit offensive odors, is long lasting and does not break

down easily, and can be easily colored to produce synthetic mulches of a variety of different colors.

The coating used to color the rubber particles can be formed from any of a variety of pigments and resins. The resins can be either water-based or solvent-based. The coating selected should be such that the rubber particles can be colored and exposed to an out-of-door environment. The coating typically will be added in an amount equal to between 3% and 25% by weight of the rubber particles. More preferably, the coating is added in an amount equal to between 3% and 10% by weight. The coating is preferably mixed with the rubber in a mixer, where the coating and rubber are tumbled.

The rubber particles are selected from a variety of rubber materials, including rubber materials, which are selected from the group consisting of natural polymers and synthetic high polymers, which are crosslinked and are thermosets. Generally, the rubber particles are derived from polymeric materials such as waste rubber buffings and ground truck tires. It is most preferred for the rubber particles to be vulcanized rubber. Once the rubber particles are selected and ground to a sufficient size, shape, and texture, the particles are mixed with a coating. The synthetic mulch is made by sufficiently mixing the rubber particles with the coating so as to adequately color the rubber particles with the coating. The mulch chips, which make up the synthetic mulch are formed in a variety of sizes and textures, so that the mulch chips may have a smooth texture or a rough texture and a diameter equal to at least 1/16 of an inch. Because the color, texture, and size can be varied, the synthetic mulch of the present invention can be made to look like a variety of different natural mulches.

The natural mulches which can be simulated by the synthetic mulch includes, but are not limited to, wood chips, tree bark, and pea gravel. The most preferred synthetic mulch is designed and dimensioned to look like ground wood chips. Thus, the present synthetic mulch is especially advantageous because it can be designed, dimensioned, and colored to look like a natural mulch, without the disadvantages associated with natural mulches. The present synthetic mulch is also advantageous because it can be readily textured, unlike other synthetic mulches, and is available in a variety of colors. Use of rubber allows for a wider variety of textures than synthetic mulches made from thermoplastics.

The synthetic mulch chips are also advantageous because they can be used to stifle weed growth and form a surface that is softer than the ground. Also, unlike other synthetic mulches, the present invention does not have sharp edges. The present synthetic mulch is further preferred over other synthetic mulches because it is available in a variety of different colors and looks more like a natural mulch. Finally, using old tires to form the synthetic mulch chips is a desirable way to dispose of the old tires.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross-sectional view of a synthetic wood chip designed to look like natural ground wood chip mulch; and,

Fig. 2 is a cross-sectional view of a synthetic wood chip designed to look like natural pea gravel mulch.

DETAILED DESCRIPTION OF THE INVENTION

In accordance with the preferred invention, a synthetic mulch is provided which is shaped and sized to look like a natural mulch, as well as, a method for making the synthetic mulch. The synthetic mulch is especially desirable because it is designed and dimensioned to look like natural mulch so that it has an attractive appearance. The synthetic mulch is also desirable because it functionally holds moisture in soil covered by the mulch, prevents weed growth, is not hazardous, does not attract insects, and provides protection for roots. The use of rubber to form the synthetic mulch is especially important because the rubber, unlike other synthetic materials, is easily colored, can be cut and shaped to look like a variety of different mulches, is non-toxic, is not hard and does not have sharp edges, can be readily textured to imitate a variety of different natural mulches, and appears to hold more water than other types of synthetic materials, such as plastic. In addition to being made of rubber, the present synthetic mulch includes an amount of coating which is especially desirable for use with the rubber chips because a synthetic mulch is formed which has a natural look and which does not lose its coloration with the passage of time.

The synthetic mulch is made by coloring the surface of a plurality of rubber particles with either a coating that includes either water-based resin or a solvent-based resin. As mentioned, rubber is crucial to the present invention because of the unique and desirable characteristics imparted by rubber and because of its ease of use. The rubber particles used may be of a variety of sizes, shapes, and texture. Beneficially, the rubber particles can be cut or shredded to resemble tree bark (as shown in Fig. 1), wood chips, pea gravel (as shown in Fig. 2), and a variety of other natural mulches, as the rubber particles can be textured in a variety of ways. The ability to contour the rubber particles means that the texture of the surface of the rubber particles

can have a variety of constructions. The surface can be smooth with a few edges similar to pea gravel, Fig. 2, or rough like tree bark, Fig. 1, so that the surface has numerous ridges and valleys of differing heights and depths. Additionally, the texture can have only a few ridges on the surface texture resulting in a rubber particle having a surface similar to a wood chip.

The method for embossing or forming the surface of the rubber particles can involve any of a variety of methods. Generally, the surface of the rubber particles is formed by passing waste rubber from tire shavings or retread tires through a machine that cuts and contours the rubber particles. The waste rubber prior to formation into a chip generally is in large strips approximately six (6) inches wide and about six (6) inches long, so that the waste rubber is then passed through a machine or device which cuts the waste rubber into particles which have either a smooth or contoured surface and which have a variety of thicknesses and lengths. Preferably, the ground rubber particles have a length ranging between about 1/16 inches and about eight (8) inches, and a width ranging between about 1/16 inches and about two (2) inches. A variety of sizes can be used, however, dependent upon the specific natural mulch it is desired to imitate.

Rubber is the most preferred material for use in forming the synthetic mulch, because it can form a synthetic mulch which is easily colored, does not have sharp edges and is flexible so that it is somewhat soft, retains an amount of water, prevents the growth of weeds, does not attract insects, and does not emit any offensive odors. The rubber for use in forming the synthetic mulch is selected from the group consisting of natural and synthetic high polymers, which are crosslinked and are thermosets. The more preferred rubber particles are high polymers, which have been vulcanized. Examples include rubber buffings or ground rubber

from truck retreads. Other rubber materials suitable for use in forming the synthetic mulch include ground automobile tires and truck tires.

Once the rubber particles are formed from the waste rubber material, the rubber is placed in a device for mixing the rubber with the coating. Any of a variety of mixing devices can be used, as long as the device chosen can adequately mix the rubber particles with coating. It is most preferred if the particles and coating are tumbled to cause mixing. Preferred mixing devices include an agitating tank and tumbler. After the rubber particles are placed in the mixing device, an amount of coating is added to the rubber particles in the mixing device. The amount of coating added will be equal to between about 3% and about 20% by weight of the rubber particles. More preferably, the coating is added in an amount equal to between about 3% and about 10% by weight of the rubber particles. It is even more preferred if the coating is added in an amount between 3% and 6%. The coating can also be added according to volume, so that the coating is added in an amount equal to from about 2% to about 20% by volume of the rubber particles. More preferably, the volume of coating added to the rubber particles is equal to between about 2.5% and about 10% by volume of the rubber particles. Practically speaking, 5 gallons will suitably color one ton of particles. Once the coating is added, the coating and rubber particles are thoroughly mixed so as to ensure that the particles are fully coated so that the synthetic mulch will be uniformly colored. Any mixing time is permissible so long as the surface of the rubber particles is uniformly colored to form the synthetic mulch. It is preferred to mix the materials between 5 and 15 minutes. Also, any mixing speed can be used so long as the rubber particles are uniformly colored to form the synthetic mulch chips. When the mixing between the coating and the rubber particles is completed, colored synthetic mulch chips are

formed which need to be dried so as to ensure that the colored synthetic mulch will retain its color when used. If complete drying of the synthetic mulch chips is not accomplished, then the synthetic mulch will not hold its color. Also, drying is necessary so that the particles will not stick together to form clumps of attached particles. The drying step can take between five (5) minutes and twelve (12) hours. Preferably, it takes between five (5) minutes and two (2) hours to complete the drying step, which can be accomplished in a drying device, such as a fluid bed dryer. The coating may also dry during the mixing step. The drying device can be any of a variety of devices, however. It is suitable to simply allow the mulch chips to air dry at room temperature.

The coating used to color the rubber particles, shreds, granules, and/or chips can be selected from a variety of different compositions, as long as the coating readily adheres to rubber and does not wash off the rubber when contacted by water. It is preferred if the coating is available in at least earth tone colors. The coating will be made from a colorant or pigment and resin. The resin will bind or affix the pigment to the particle. The resins are either water-based or solvent-based. The generic water-based resins include resin binders selected from the group consisting of acrylic, vinyl chloride, polyurethane, SBS (styrene butadiene styrene), polyvinyldiene chloride, and neoprene. The water-based resins can be solubilized or emulsions. The emulsions are latex compositions. The generic solvent-based resins include resin binders selected from the group consisting of polyurethanes, hypalon, neoprene, chlorinated polyethylene, vinyl chloride, vinyl acetate, and chlorinated rubber. Pigments can be added to the resins to form the color of the finished coating. Combinations of pigments may also be used. Additionally, other constituents can be mixed into the coatings, such as fire retardants. The

water-based resin coatings are preferred because not only are they available in earth tone colors, but they are available in a variety of colors.

Once formed, the synthetic mulch is then placed around bushes and trees or used as edging to enhance the appearance of a lawn. As mentioned, the synthetic mulch will protect certain plants, such as trees and bushes, and keep undesirable plants, like weeds from growing. The synthetic mulch can also be used as a play surface or for any area, which requires a surface that is somewhat soft. Additionally, the synthetic mulch is desirable because it can be colored so that the surface is of a color desirable to the user.

EXAMPLES

Example 1

An amount of synthetic mulch for use on an ornamental lawn was prepared by placing in a five (5) gallon stainless steel bucket, an amount of coating and rubber particles. The rubber particles are known as-rubber buffings and were derived from tire retreads. The rubber particles had a length ranging between about 1/8 of an inch and about three (3) inches and a width ranging between about 1/4 of an inch and about 3/4 of an inch. The rubber particles were added to the bucket in an amount equal to 40 cups.

After the rubber particles were added to the stainless steel bucket an amount of coating was then added to the rubber particles in the stainless steel bucket. The color added was cypress and is manufactured under the name VISICHROME, and is made by Futura Coatings, Inc. of St. Louis, Missouri. The amount of coating added to the stainless steel bucket was equal to one (1) cup or 2.5% by volume of the rubber particles.

Once the coating and the rubber particles were added to the stainless steel bucket the two constituents were hand mixed for approximately two minutes, which was sufficient to thoroughly coat the rubber particles with the coating. After mixing, the colored rubber particles were removed from the stainless steel bucket and were spread out and allowed to air dry for two (2) hours. Upon completion of drying, the synthetic mulch was formed and ready for use.

Example 2

In each of Examples 2-4, 2 lbs. of rubber buffings were used. The buffings were the same as disclosed in Example 1. The buffings were placed in a bag with approximately 1 to 1.5 ounces of the coating, and were then mixed. The mixing was sufficient to cover the sample pieces of the rubber. After mixing, the colored rubber particles were removed from the bag and laid out on drywall board to dry.

The first coating tested was White 452, Lot #SA0337, produced by Futura Coatings Inc. of St. Louis, Missouri. The coating was comprised of white pigment and a water-based resin. The resin was a polyurethane latex. Thus, an aqueous polyurethane mixture was tested.

The sample was allowed to dry for 30-60 minutes, at which time, the synthetic mulch was formed and ready to use. It was observed that the mulch was suitable for use.

Example 3

The present sample was prepared as disclosed in Example 2, except the coating added was Red 8903, Lot #SO2077, produced by Futura Coatings, Inc. of St. Louis, Missouri. The coating tested was formed from red pigment and a solvent-based resin. The resin was an

aromatic urethane. The sample was allowed to dry for 30-60 minutes, at which time, the synthetic mulch was formed and ready to use.

Example 4

The present sample was prepared as disclosed in Example 2, except the coating added was White 1101, Lot #SO2107, produced by Futura Coatings, Inc. of St. Louis, Missouri. The 1101 coating tested was formed from a white pigment and a solvent-based resin. The resin was a vinyl chloride.

The sample was allowed to dry for 10-12 hours, at which time, the synthetic mulch was formed and ready to use. It was observed that the mulch was suitable for use.

Example 5

An amount of synthetic mulch was prepared by placing in a cement mixer 2,000 lbs. of rubber particles and 15-gallons of VISOCHROME coating, manufactured by Futura Coatings, Inc. of St. Louis, Missouri. The particles were the same as disclosed in Example 1. The coating and rubber particles were tumbled for five minutes and when they were removed from the tumbler, the coating was adhered and dried onto the particles. The coated particles were then ready for use. The cement mixer was manufactured by Doyle Manufacturing.

Thus, there has been shown and described a novel synthetic mulch, which fulfills all the objects and advantages sought therefore. It would be apparent to those skilled in the art, however, that many changes, variations, modifications, and other uses and applications for the subject method and composition are possible, and also such changes, variations, modifications,

and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the claims which follow.